NEWSLETTER OF THE AREA PLANNING BOARD OF PALM BEACH COUNTY - P. O. BOX 1548 - WEST PALM BEACH, FLORIDA, 33402

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NATURAL DEVELOPMENT OF PALM BEACH COUNTY PRIOR TO SETTLEMENT

Palm Beach County is an Atlantic coastal county containing an abundance of ocean beaches in addition to a wealth of inland salt and fresh water bodies. These surface waters are easily the county's most valuable physical asset in that they assume an important role in the county's economic structure and are a major contributor to environmental quality.

Significant man-made changes to the county's surface waters and waterfront lands did not occur until the late nineteenth century when the first permanent settlers arrived. However, prior to man's changes, natural changes occurred which far exceeded those which are credited to or blamed on man.

GEOLOGICAL DEVELOPMENT

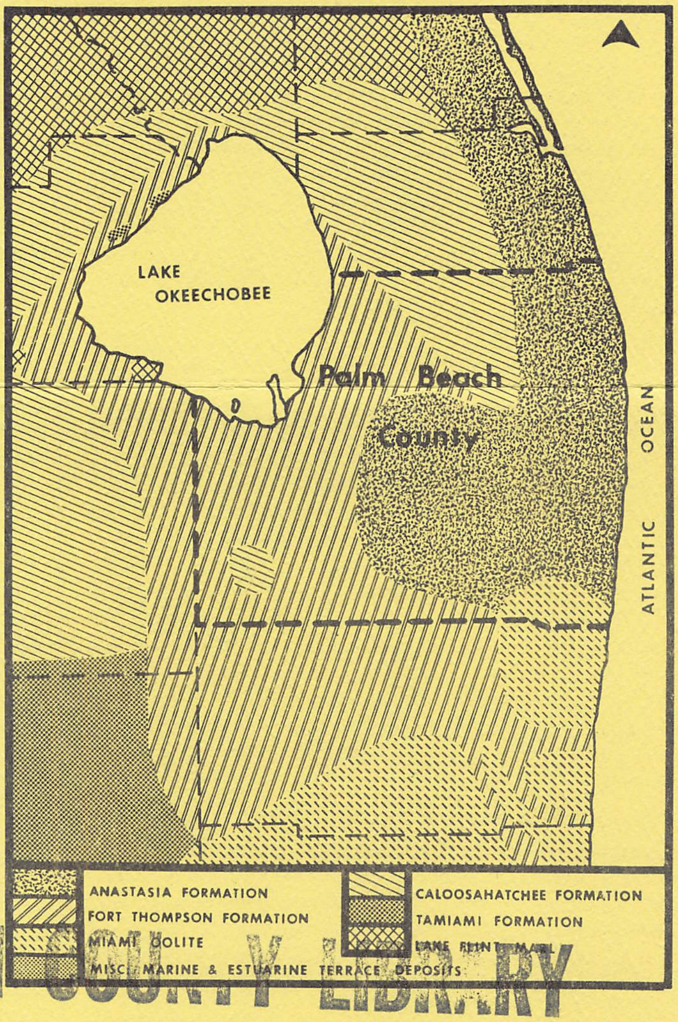
Peninsular Florida is the exposed portion of a vast tableland, largely covered by marine waters, and bounded by steeply pitching sides on the east, south, and west. The adjacent seas have, from time to time, cycled from much higher to much lower elevations than exist today. Having occured during the Great Ice Age, these sea level fluctuations were caused by the forming and melting of glaciers which first froze, then released fantastic quantities of water. During the times when the ice sheets were at their maximum, both in thickness and southerly advancement, the level of the sea was much lower and more land surface was exposed. In contrast, when the ice sheets melted, water was returned to the sea, raising the level of the sea, thereby flooding much of presently exposed Florida.

The rise and fall of the sea greatly influenced the geology and topography of Palm Beach County, and all of Florida as well. The interglacial seas in the South Florida area were as warm or possibly somewhat warmer than now and teemed with marine life. Shellfish were especially abundant. Sand that was eroded from the beaches in the central part of the peninsula was swept seaward by ocean currents, mixed with shellfish, and deposited in an area extending from southern Palm Beach County north to St. Augustine. This deposit underlies the eastern one-third of Palm Beach County and forms the backbone of the Atlantic Ridge, the crest of which is parallel to and a mile or two inland from the present Atlantic shore. This deposit of sand and shell material was named the Anastasia Formation after Anastasia Island near St. Augustine where the shells and sand are cemented together with lime and form what is commonly known as Coquina rock.

Much of the Anastasia Formation in Palm Beach County is composed of loose sand and shell though in local areas, especially along the beaches, it has been cemented into a fairly hard rock. The Anastasia deposit in Palm Beach County is covered by a thin layer of sand, except for a few exposures mostly at or near the Atlantic shore. At Boca Raton, rock is exposed at the beach and extends fifteen to twenty feet above sea level. In the Town of Palm Beach, just south of the Palm Beach Country Club, a cross section of the rock has been exposed in a road cut. Low, reef-like exposures of the rock can be seen at intervals along the ocean beaches at these points as well as along the section of beach between the two county parks south of the Jupiter Inlet. Probably the most dramatic exposure occurs at Blowing Rocks, located at the edge of the Atlantic about a mile and a half north of Jupiter Inlet, just north of the Palm Beach County line. Here the exposed rock has developed a number of solution holes through which water is violently flung skyward when the rock is struck by ocean waves.

Of the three remaining rock formations in Palm Beach County, the Caloosahatchee Marl dates back to the Pliocene Age, while the Fort Thompson Formation and the Miami Oolite both developed during the age of the glaciers, the Pleistocene Age. The Miami Oolite is the only formation with any degree of permeability, and this is only in a vertical direction due to the tremendous development of vertical solution holes.

GEOLOGY OF PALM BEACH COUNTY



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BEGINNINGS OF PALM BEACH ISLAND

Palm Beach Island owes its origin to a submarine bar of sand and shells (Anastasia) that formed when the sea was twenty-five or more feet higher than its present elevation. The exposed portion of the Atlantic ridge was a series of linear islands, not greatly dis-similar in character to that of the Florida Keys today, differing only in composition. That is, sand and shell rather than the coral limestone of the Keys.

As the sea level began to drop, offshore bars like Palm Beach Island began to emerge as offshore islands. The area between these offshore islands and the more westerly located coastal ridge was converted from open sea to inshore marine waters, protected from the sea by the emerging offshore islands.

These inshore waters ran continuously along the coast of Palm Beach County and received increasing protection from the sea as the offshore bars became increasingly exposed by further sea level reduction and by the build up of drifting sand. Once the offshore bars became sufficiently exposed to form a continuous barrier, the inshore lagoons became completely isolated from the sea, except when conditons resulted in a breakthrough of the barrier bar, thereby creating a natural inlet.

NATURAL INLETS

Natural inlets are inherently unstable. Their instability stems from the constantly shifting forces of waves and currents which erode sand from one location and deposit it in another. When sand drifts into an inlet, the tendency is for it to deposit and build up into a sand bar which eventually closes the inlet. The scouring effect of tidal flow through an inlet works in opposition to the inlet being filled with sand.

When conditions permit development of an exposed bar completely across an inlet, inland waters become impounded. When a sufficient head of water develops behind a closed inlet or when storm-driven ocean waves pound the barrier bar with sufficient force, the weakest or lowest point in the bar is breached, permitting impounded waters to quickly dump into the Atlantic, creating a channel as it rushes out.

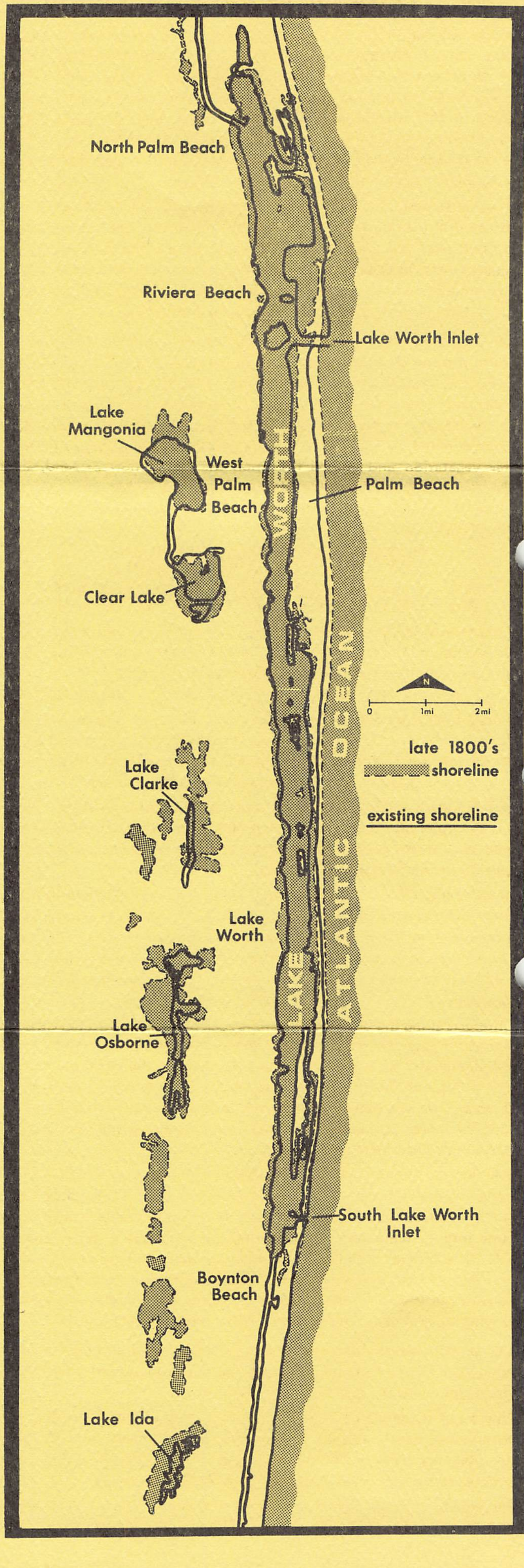
When the protected lagoons were connected to the sea by natural inlets, their waters were salt to brackish, dependent upon the size and condition of the inlet, the size of the drainage area tributary to the lagoons, and the wetness or dryness of the season. Aquatic plant and animal life in the lagoons was constantly modified in accord with natural modifications to the lagoons' salinity patterns. When sea level was higher, there were several natural inlets along the County's coast. Lakes Worth, Wyman, Rogers, and Boca Raton were all part of a single inland water body, an estuary much like the Indian River in Indian River County today. Fish in this estuary were predominantly salt water varieties. Oysters and other shellfish were abundant. The shoreline and adjoining lowland was vegetated with mangrove.

With the further dropping of the sea and the concurrent emergence of the barrier islands and reduction in the number and size of natural inlets, Lake Worth, the largest remaining segment of the coastal lagoon, became physically separated from the sea. Its waters became entirely fresh and stood somewhat above sea level, the precise surface elevation depending on the wetness or dryness of the season. The only connection between the waters of Lake Worth and the sea was by ground water seepage through the barrier island, or, in times of heavy rainfall and high waters, flow through fresh water sloughs to tidal creeks connected with a natural inlet north or south of the lake. It is not unlikely that hurricane forces occasionally broke an inlet through the barrier island which separated Lake Worth from the sea, but such an inlet would invariably close within a short time span. The relatively small drainage area tributary to Lake Worth accounts for the absence of a natural inlet. In wet years, when inland surface waters built up and flowed toward the sea, waters west of Lake Worth flowed north through the Loxahatchee marsh to Jupiter Inlet.

Jupiter Inlet and Boca Raton Inlet are both natural in that they predate human settlement in Palm Beach County. Both have closed and reopened many times as the result of natural causes and their locations have varied substantially as they migrated north and south in the manner of unstabilized inlets along the entire coast of Florida.

Of the two, Boca Raton Inlet opened less frequently and stayed closed much longer than the Jupiter Inlet. During periods of extended inlet closure, water inside these inlets would become entirely fresh.

LAKE WORTH - LATE 1800's



ICE AGE EFFECTS ON WESTERN PALM BEACH COUNTY

The rise and fall of the seas during the Great Ice Age wrought changes to the westerly portion of Palm Beach County which were equally as great as those which the coastal area underwent. During periods when the south-central portion of Florida was a great, warm, shallow bay, billions of tiny marine animals lived and died, their skeletons collectively forming layers of limestone. During some of the high sea periods, fine sand was washed down from central Florida and mixed with marine animal skeletons, forming sandy limestone.

For some reason, the sand which was wave and current washed into south-central Florida from the north and northwest was not uniformly deposited over the area. Perhaps because of the blocking effect of a submarine bar, a large area was cut off from the source of sand, and as the surrounding area was built up, a depression was formed in the ocean floor. That depression was to become Lake Okeechobee.

When the last submergence of the Florida Peninsula terminated, the western portion of Palm Beach County began to emerge from the sea. It was first occupied by mangrove and other salt tolerant vegetation. As sea level continued to fall, Lake Okeechobee and the surrounding area converted to a fresh water environment, and the salt tolerant vegetation retreated to the south. Subsequent growth and decay of fresh water vegetation and animal life upon the foundation of sand, shell beds, and limestone built the land surface to a higher elevation and formed the Florida Everglades, the largest single body of organic soil in the world.

PHYSICAL CONDITIONS AT THE TIME OF STATEHOOD

At the time of statehood in 1845, Palm Beach County was inhabited by only a small garrison at Ft. Jupiter, a few Indians, and some runaway Negro slaves to whom the Indians gave refuge.

Jupiter Inlet was open and navigable for small boats. It had closed the previous year, but was reopened by a U.S. mail carrier with the assistance of soldiers from Fort Jupiter, who dug a ditch through the bar with shovels, permitting the impounded waters inside the inlet to rush out to the sea, deepening and widening the shovel-made cut.

The next open inlet to the south was the Hillsborough Inlet. Aside from the open sea, there was no navigable connection between the two inlets, except for Indian canoe trails through the sawgrass, their use requiring an overland portage or two.

The ocean beaches were much broader than at present with substantially greater area. existing between the beach dunes and the water's edge. Beach erosion was in progress, however, and the beaches were less broad and gently sloping than they had been about 1800 years earlier, when the sea was at its most recent low elevation, about five feet lower than at present.

At intervals along the beaches, Anastasia rock deposits protruded through beach sand near the water's edge. Other rock was submerged or partially submerged by the ocean waters adjacent to the beaches. A large rocky point, the end of which was a mass of rock which stood quite high above the sea, projected out from the beach about ten miles south of Jupiter Inlet. This is the area where the first man-made inlet in Palm Beach County was later to be dug.

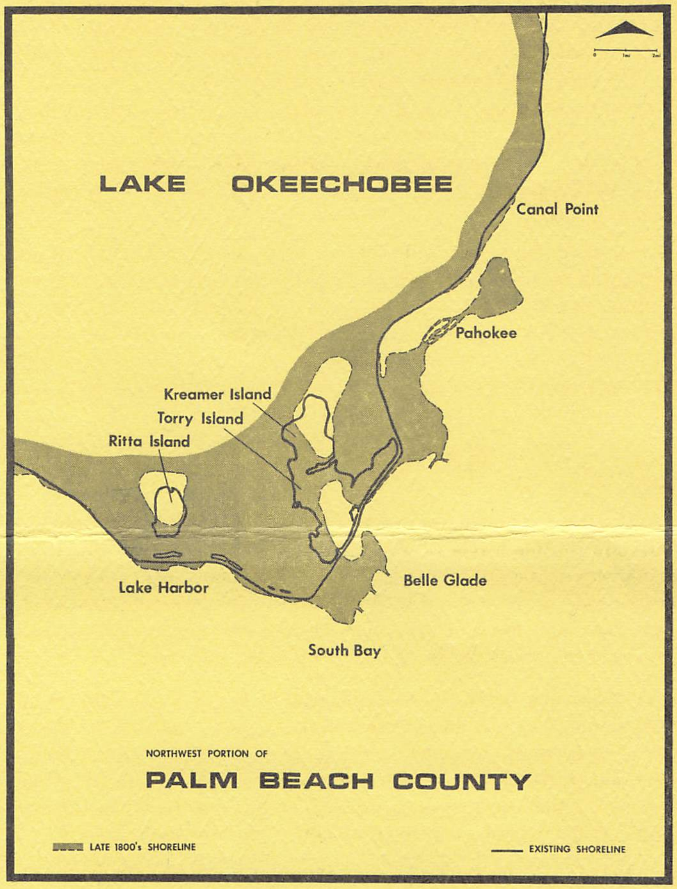
Inside Jupiter Inlet lay a broad, relatively deep waterway which extended west where it became the main channel of the Loxahatchee River and its north and southwest forks, which served as drainage outlets for a large interior watershed. Intersecting the waterway a short distance inside the inlet was an additional waterway which extended in a northerly direction just inside the barrier island, forming a navigable connection with the Indian River, although in places the channel was narrow and twisting, and many oyster bars created navigational hazards.

Lakes Worth, Rogers, Wyman and Boca Raton were all larger than at present. Ducks and fish swam in areas that have subsequently been converted from water to land by dredging and filling.

Today's Lakes Mangonia, Clear, Osborne, and Ida were among the natural lakes which existed at the time of statehood but in those times, the lake water elevations were much higher than at present and the lakes were much larger than their present day remnants.

Lake Worth, then as now, lay west of the beach ridge, began about seven miles south of Jupiter Inlet, and extended a little more than twenty miles to the south. The lake had only two islands of consequence, both exposed portions of an old reef. One, near the lake's north end, was rocky, hammock covered, and housed a tremendous bird rookery. It is known today as Big Munyon Island. The other, today's Hypoluxo Island, was partially wooded hammock land, with the westerly side and the north end being swampy and covered with marsh vegetation. Aside from these two islands, the lake was open from east to west shore, except for a few smaller islands, and a few instances where water depths were shallow enough to permit sawgrass, reeds, et cetera, to have established.

PALM BEACH COUNTY PORTION OF LAKE OKEECHOBEE - LATE 1800's



The Hillsborough River, which emptied out Hillsborough Inlet four miles south of the present county line, extended into the southeast corner of Palm Beach County, where it was little more than a sawgrass slough with intermittent patches of open water. Modest amounts of living mangrove on the southerly shore of Lake Boca Raton testified that Boca Raton Inlet had been open in the not greatly distant past.

Lake Okeechobee, the receiving basin for the Kissimmee River watershed, had no well defined outlet to tidewater and its low, ill defined southern bank was regularly overtopped during the annual rainy season. The lake shape and area was substantially modified from wet to dry seasons as its boundary first advanced, then receded. Predominant drainage through the Everglades to tidewater was south and southwest, but during high water periods broad marshland sloughs (depressions in the sandy flatlands) connected the Everglades in central and northern Palm Beach County to tidewaters at Jupiter and St. Lucie Inlets.

In addition to heavy concentrations of fish and shellfish in the tidal waters of the County, fresh water fish also abounded wherever open waters occurred, particularly in Lake Okeechobee, with its tremendous surrounding marsh. Bird and animal populations were dense. Deer and bear were plentiful. In the winter, great flocks of ducks migrated to the county's waters. In contrast to Lake Okeechobee and the coastal areas, there was very little fish, bird, or animal life in the dense sawgrass plain of the Everglades. On the minus side, in the eyes of the occasional visitor to the county at the time of statehood, was the frequently huge population of mosquitoes and sandflies.

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